

What is claimed is:

1. An isolated polynucleotide that encodes:

(i) a polypeptide comprising an amino acid sequence that is homologous to the amino acid sequence of a *Helicobacter* polypeptide, wherein said amino acid sequence of said *Helicobacter* polypeptide is selected from the group consisting of the amino acid sequences as shown in SEQ ID NO:2 (GHPO 13), SEQ ID NO:4 (GHPO 73), SEQ ID NO:6 (GHPO 90), SEQ ID NO:8 (GHPO 107), SEQ ID NO:10 (GHPO 136), SEQ ID NO:12 (GHPO 191), SEQ ID NO:14 (GHPO 213), SEQ ID NO:16 (GHPO 240), SEQ ID NO:18 (GHPO 408), SEQ ID NO:20 (GHPO 411), SEQ ID NO:22 (GHPO 419), SEQ ID NO:24 (GHPO 431), SEQ ID NO:26 (GHPO 474), SEQ ID NO:28 (GHPO 591), SEQ ID NO:30 (GHPO 596), SEQ ID NO:32 (GHPO 699), SEQ ID NO:34 (GHPO 724), SEQ ID NO:36 (GHPO 730), SEQ ID NO:38 (GHPO 761), SEQ ID NO:40 (GHPO 804), SEQ ID NO:42 (GHPO 805), SEQ ID NO:44 (GHPO 812), SEQ ID NO:46 (GHPO 879), SEQ ID NO:48 (GHPO 888), SEQ ID NO:50 (GHPO 986), SEQ ID NO:52 (GHPO 1056), SEQ ID NO:54 (GHPO 1081), SEQ ID NO:56 (GHPO 1100), SEQ ID NO:58 (GHPO 1140), SEQ ID NO:60 (GHPO 1148), SEQ ID NO:62 (GHPO 1200), SEQ ID NO:64 (GHPO 1212), SEQ ID NO:66 (GHPO 1258), SEQ ID NO:68 (GHPO 1263), SEQ ID NO:70 (GHPO 1273), SEQ ID NO:72 (GHPO 1284), SEQ ID NO:74 (GHPO 1299), SEQ ID NO:76 (GHPO 1327), SEQ ID NO:78 (GHPO 1346), SEQ ID NO:80 (GHPO 1378), SEQ ID NO:82 (GHPO 1412), SEQ ID NO:84 (GHPO 1443), SEQ ID NO:86 (GHPO 1466), SEQ ID NO:88 (GHPO 1476), SEQ ID NO:90 (GHPO 1536), SEQ ID NO:92 (GHPO 1559), SEQ ID NO:94 (GHPO 427), SEQ ID NO:96 (GHPO 1045), and SEQ ID NO:98 (GHPO 1262); or

(ii) a derivative of said polypeptide encoded by said polynucleotide.

2. The isolated polynucleotide of claim 1, which encodes a mature form of said polypeptide.

3. The isolated polynucleotide of claim 1 or 2, wherein the polynucleotide is a DNA molecule.

4. The isolated polynucleotide of claim 1, which is a DNA molecule that can be amplified and/or cloned by polymerase chain reaction from a *Helicobacter* genome, using either:

- A 5' oligonucleotide primer having a sequence as shown in SEQ ID NO:101 and a 3' oligonucleotide primer having a sequence in SEQ ID NO:102;
- A 5' oligonucleotide primer having a sequence as shown in SEQ ID NO:103 and a 3' oligonucleotide primer having a sequence in SEQ ID NO:104;
- A 5' oligonucleotide primer having a sequence as shown in SEQ ID NO:105 and a 3' oligonucleotide primer having a sequence in SEQ ID NO:106;
- A 5' oligonucleotide primer having a sequence as shown in SEQ ID NO:107 and a 3' oligonucleotide primer having a sequence in SEQ ID NO:108;
- A 5' oligonucleotide primer having a sequence as shown in SEQ ID NO:109 and a 3' oligonucleotide primer having a sequence in SEQ ID NO:110; or
- A 5' oligonucleotide primer having a sequence as shown in SEQ ID NO:111 and a 3' oligonucleotide primer having a sequence in SEQ ID NO:112.

5. The isolated DNA molecule of claim 4, which can be amplified and/or cloned by the polymerase chain reaction from a *Helicobacter pylori* genome.

6. The isolated polynucleotide of claim 1, which is a DNA molecule that encodes the mature form or a derivative of a polypeptide encoded by the DNA molecule of claim 4.

7. The isolated polynucleotide of claim 1, which is a DNA molecule that encodes the mature form or a derivative of a polypeptide encoded by the DNA molecule of claim 5.

8. A compound, in a substantially purified form, that is the mature form or a derivative of a polypeptide comprising an amino acid sequence that is homologous to a *Helicobacter* amino acid sequence that is selected from the group consisting of the amino acid sequences as shown in SEQ ID NO:2 (GHPO 13), SEQ ID NO:4 (GHPO 73), SEQ ID NO:6 (GHPO 90), SEQ ID NO:8 (GHPO 107), SEQ ID NO:10 (GHPO 136), SEQ ID NO:12 (GHPO 191), SEQ ID NO:14 (GHPO 213), SEQ ID NO:16 (GHPO 240), SEQ ID NO:18 (GHPO 408), SEQ ID NO:20 (GHPO 411), SEQ ID NO:22 (GHPO 419), SEQ ID NO:24 (GHPO 431), SEQ ID NO:26 (GHPO 474), SEQ ID NO:28 (GHPO 591), SEQ ID NO:30 (GHPO 596), SEQ ID NO:32 (GHPO 699), SEQ ID NO:34 (GHPO 724), SEQ ID NO:36 (GHPO 730), SEQ ID NO:38 (GHPO 761), SEQ ID NO:40 (GHPO 804), SEQ ID NO:42 (GHPO 805), SEQ ID NO:44 (GHPO 812), SEQ ID NO:46 (GHPO 879), SEQ ID NO:48 (GHPO 888), SEQ ID NO:50 (GHPO 986), SEQ ID NO:52 (GHPO 1056), SEQ ID NO:54 (GHPO 1081), SEQ ID NO:56 (GHPO 1100), SEQ ID NO:58 (GHPO 1140), SEQ ID NO:60 (GHPO 1148), SEQ ID NO:62 (GHPO 1200), SEQ ID NO:64 (GHPO 1212), SEQ ID NO:66 (GHPO 1258), SEQ ID NO:68 (GHPO 1263), SEQ ID NO:70 (GHPO 1273), SEQ ID NO:72 (GHPO 1284), SEQ ID NO:74 (GHPO 1299), SEQ ID NO:76 (GHPO 1327), SEQ ID NO:78 (GHPO 1346), SEQ ID NO:80 (GHPO 1378), SEQ ID NO:82 (GHPO 1412), SEQ ID NO:84 (GHPO

1443), SEQ ID NO:86 (GHPO 1466), SEQ ID NO:88 (GHPO 1476), SEQ ID NO:90 (GHPO 1536), SEQ ID NO:92 (GHPO 1559), SEQ ID NO:94 (GHPO 427), SEQ ID NO:96 (GHPO 1045), and SEQ ID NO:98 (GHPO 1262); or

(ii) a derivative of said polypeptide.

9. The compound of claim 8, which is the mature form or a derivative of a polypeptide encoded by a DNA molecule of claim 4.

10. The compound of claim 8, which is the mature form or a derivative of a polypeptide encoded by a DNA molecule of claim 5.

11. A method of preventing or treating *Helicobacter* infection in a mammal, said method comprising administering to said mammal a prophylactically or therapeutically effective amount of a compound of claim 8, 9, or 10.

12. The method of claim 11, further comprising administering an antibiotic, an antisecretory agent, a bismuth salt, or a combination thereof.

13. The method of claim 12, wherein said antibiotic is selected from the group consisting of amoxicillin, clarithromycin, tetracycline, metronidazole, and erythromycin.

14. The method of claim 12, wherein said bismuth salt is selected from the group consisting of bismuth subcitrate and bismuth subsalicylate.

15. The method of claim 12, wherein said antiseecretory agent is a proton pump inhibitor.

16. The method of claim 15, wherein said proton pump inhibitor is selected from the group consisting of omeprazole, lansoprazole, and pantoprazole.

17. The method of claim 12, wherein said antiseecretory agent is an H₂-receptor antagonist.

18. The method of claim 17, wherein said H₂-receptor antagonist is selected from the group consisting of ranitidine, cimetidine, famotidine, nizatidine, and roxatidine.

19. The method of claim 12, wherein said antiseecretory agent is a prostaglandin analog.

20. The method of claim 19, wherein said prostaglandin analog is misoprostil or enprostil.

21. The method of claim 11, which further comprises administering a prophylactically or therapeutically effective amount of a second *Helicobacter* polypeptide or a derivative thereof.

22. The method of claim 21, wherein the second *Helicobacter* polypeptide is a *Helicobacter* urease, a subunit, or a derivative thereof.

23. A composition comprising a compound of claim 8, 9, or 10, together with a physiologically acceptable diluent or carrier.

24. The composition of claim 23, further comprising an adjuvant.

25. The composition of claim 23, further comprising a second *Helicobacter* polypeptide or a derivative thereof.

26. The composition of claim 25, wherein said second *Helicobacter* polypeptide is a *Helicobacter* urease, or a subunit or a derivative thereof.

27. A method of preventing or treating *Helicobacter* infection in a mammal, said method comprising administering to said mammal a prophylactically or therapeutically effective amount of a polynucleotide of claim 1 or 2.

28. A method of preventing or treating *Helicobacter* infection in a mammal, said method comprising administering to said mammal a prophylactically or therapeutically effective amount of a polynucleotide of claim 4, 5, or 6.

29. A method of preventing or treating *Helicobacter* infection in a mammal, said method comprising administering to said mammal a prophylactically or therapeutically effective amount of a polynucleotide of claim 7.

30. A composition comprising a viral vector, in the genome of which is inserted a DNA molecule of claim 3, said DNA molecule being placed under conditions for expression in a mammalian cell and said viral vector being admixed with a physiologically acceptable diluent or carrier.

31. The composition of claim 30, wherein said viral vector is a poxvirus.

32. A composition that comprises a bacterial vector comprising a DNA molecule of claim 3, said DNA molecule being placed under conditions for expression and said bacterial vector being admixed with a physiologically acceptable diluent or carrier.

33. The composition of claim 32, wherein said vector is selected from the group consisting of *Shigella*, *Salmonella*, *Vibrio cholerae*, *Lactobacillus*, *Bacille bilié de Calmette-Guérin*, and *Streptococcus*.

34. A composition comprising a polynucleotide of claim 1 or 2 , together with a physiologically acceptable diluent or carrier.

35. The composition of claim 34, wherein said polynucleotide is a DNA molecule that is inserted in a plasmid that is unable to replicate and to substantially integrate in a mammalian genome and is placed under conditions for expression in a mammalian cell.

36. An expression cassette comprising a DNA molecule of claim 3, said DNA molecule being placed under conditions for expression in a procaryotic or eucaryotic cell.

37. A process for producing a compound of claim 8, which comprises culturing a procaryotic or eucaryotic cell transformed or transfected with an expression cassette of claim 36, and recovering said compound from the cell culture.

38. A method of preventing or treating *Helicobacter* infection in a mammal, said method comprising administering to said mammal a prophylactically or therapeutically effective amount of an antibody that binds to the compound of claim 8, 9, or 10.